

Teaching for Mastery of Mathematics -Textbook Assessment Criteria

Each publisher should provide evidence that their textbook materials meet the criteria outlined below in order to be added to the list of recommended textbooks to support teaching for mastery. Information on how to do this can be obtained from the Department for Education by e-mailing maths.programme@education.gov.uk

Core criteria for a high-quality primary textbook for teaching for mastery of mathematics	Explanatory notes
<p>Minimum Requirement - Structure of resources</p> <p>There is a comprehensive set of resources for both teachers and pupils.</p> <p>THE FOLLOWING ARE ESSENTIAL REQUIREMENTS: MATERIALS THAT DO NOT MEET THESE CRITERIA WILL NOT BE ASSESSED ANY FURTHER:</p> <ul style="list-style-type: none">• A rigorous quality assurance process is in place to avoid mathematical and other errors.• The series must cover every primary year group (or KS1 as a minimum with plans mapping out progression to KS2).• It should reflect a teaching for mastery approach where pupils progress together.• It must include:<ul style="list-style-type: none">• teacher manuals with curriculum content and pedagogical guidance; and• hard copy pupil textbooks and pupil practice books OR hard copy pupil textbooks with practice exercises integrated into pupil resources.	<p>A high quality mathematics textbook is an educational resource that supports teaching and can be used by pupils both in lessons and for independent study.</p> <p>It should be a comprehensive tool, providing support for the development of both procedural fluency and conceptual understanding in mathematics as exemplified by proven practice in the high performing Asian jurisdictions. It is supported by carefully sequenced materials, introducing elements of concepts in a logical and coherent order. There is sufficient detail and challenge to enable all pupils to make good progress.</p> <p>Materials should embody high expectations of all pupils, and how they will progress together.</p>

<p>1</p>	<p>Curriculum coverage</p> <p>Content reflects the breadth of the primary mathematics curriculum and provides opportunities for greater depth of study of fundamental concepts.</p> <p>The textbooks and associated materials must:</p> <ul style="list-style-type: none"> • reflect the breadth of the primary mathematics national curriculum; • offer sufficient time and depth for the study of fundamental mathematics concepts; and • reflect the specific requirements relating to calculation with the inclusion of both mental calculation strategies and the use of efficient written calculation methods. 	<p>It is not essential for every element of the mathematics programme of study to be included, but the breadth of the curriculum should be reflected.</p> <p>Fundamental concepts should be addressed in detail to ensure there are no gaps in understanding and each area is mastered securely before moving onto the next.</p> <p>Greater focus and time given to fundamental concepts in mathematics enables understanding to become more secure, be sustained over time and be built upon.</p>
<p>2</p>	<p>Mathematical Coherence</p> <p>Content is set out in logical sequences; mathematical concepts are built in small logical steps with attention to detail and difficult points.</p> <p>The textbooks and associated materials must:</p> <ul style="list-style-type: none"> • set out the teaching sequence in carefully organised sections with clear lines of progression; • show how current ideas develop from previous work and are interconnected; and • integrate understanding of mathematical concepts, such as fractions with the development of factual and procedural fluency. 	<p>Teaching for mastery sets out a small step, coherent journey and addresses one new point at a time, building upon prior knowledge.</p> <p>Mathematical coherence, both within and across textbook material is essential to help pupils connect mathematical ideas and make connections between closely related concepts, deepening understanding.</p>

<p>3</p>	<p>Mathematics concepts and representation</p> <p>The content and its presentation serves to expose and reinforce a particular mathematical concept.</p> <p>Specific content should:</p> <ul style="list-style-type: none"> • focus plainly on the concept to be taught and offer a variety of opportunities for pupils to develop understanding of it; • contain representations in the form of pictures and diagrams which reveal underlying mathematical structures and help make sense of mathematical ideas; and • be laid out with clarity, avoiding cognitive overload and irrelevant material. 	<p>A high quality textbook will use illustrations and contexts that are directly relevant to the particular mathematical ideas and concepts, and not merely for decoration or attractive presentation.</p> <p>Representation of mathematics may be in the form of text, symbols, images or diagrams. They should be carefully designed to maximise understanding.</p>
<p>4</p>	<p>Mathematics structure and language</p> <p>The mathematics is set out formally and with accuracy and is reinforced with the use of correct mathematical vocabulary.</p> <p>The textbooks and associated materials must ensure that:</p> <ul style="list-style-type: none"> • the mathematics is represented formally and correctly; • correct and precise mathematical vocabulary is introduced early alongside the concept; and • use of formal mathematical language is developed in a coherent and consistent manner. 	<p>Mathematics is a formal and systematic discipline with an associated vocabulary. The use of correct terminology is a fundamental. It cements understanding, reduces misconceptions and provides the foundation for later concepts.</p> <p>'Quick tips' to achieve superficial success should be avoided.</p>

<p>5</p>	<p>Activities to enable progression in mathematics</p> <p>Activities and interactions move pupils on by engaging them in explicit mathematical thinking about taught concepts.</p> <p>The textbooks and associated materials should present activities which:</p> <ul style="list-style-type: none"> • build further understanding of a taught concept by exposing relationships; • challenge pupils to think about a concept further to deepen understanding; • support generalisation of the mathematics; and • ensure that related or contrasting concepts and examples are presented together where this aids understanding. 	<p>For example, addition and subtraction examples shown together; e.g. $3 + 1 = 4$; $4 - 1 = 3$ to expose their inverse relationships</p> <p>and activities such as:</p> <p>Which is closer to 1?</p> <p>$\frac{7}{8}$ or $\frac{23}{24}$</p> <p>Explain how you know.</p> <p>In this example pupils are challenged to think about the proportional size of the numerator in relation to the denominator, a fundamental idea within the concept of fractions.</p>
<p>6</p>	<p>Practice Exercises</p> <p>Exercises are designed to deepen conceptual understanding and strengthen procedural fluency.</p> <p>The textbooks and associated materials should include:</p> <ul style="list-style-type: none"> • tasks which provide an appropriate level of challenge and do not oversimplify the mathematics; • exercises which embody the concept of variation and reinforce the underlying structure of concepts and relationships; and • sufficiency in intelligent and varied practice exercises, including those outside contact time*. 	<p>A poor textbook will merely present collections of questions to practice and will not develop conceptual knowledge.</p> <p>The use of intelligent practice exercises draws attention to mathematical structures and relationships to deepen pupils' conceptual understanding, whilst at the same time developing fluency.</p> <p>Challenge questions require pupils to reason and think more deeply, demonstrating that they can apply the mathematics they have learnt to an unfamiliar context.</p>

<p>7</p>	<p>Assessment</p> <p>The textbooks should include materials which enable regular assessment of understanding and progress.</p> <p>The textbooks and associated materials must:</p> <ul style="list-style-type: none"> • support assessment by ensuring that both formative and summative assessments are incorporated into materials, allowing both pupils and teachers to measure progress and inform future teaching; and • ensure that assessment activities allow pupils to review key ideas and concepts and to check their own understanding, ensuring that they are ready for the next stage of teaching. 	<p>Assessments allow teachers to make decisions on when intervention is needed to enable students to keep up and when teaching points need to be reinforced for the class. It should help identify specific strengths and weaknesses in pupil understanding.</p> <p>Assessment should not be an arbitrary add-on; it should be integral to the approach of carefully designed tasks.</p>
<p>8</p>	<p>Teacher support</p> <p>The teacher guide supports the development of teacher subject knowledge and pedagogical practice.</p> <p>The teacher guide must:</p> <ul style="list-style-type: none"> • set out guidance on effective use of the textbook and supporting materials; • provide insight into why the tasks and exercises have been selected and the key points that should be drawn out; • take account of classic, standard or predictable mistakes, misconceptions and misunderstandings associated with the topic under consideration, and • provide information that enables teachers to anticipate and plan how to tackle these. 	<p>Many primary teachers may require support in gaining detailed subject knowledge to teach mathematics confidently.</p> <p>A high quality textbook must be educative for teachers as well as pupils.</p> <p>Teaching sequences and scripts or lesson guides are helpful in guiding for teachers to focus on key teaching points.</p>

*A reference for understanding **variation theory** is the paper by Gu L., Huang, R., & Marton, F. (2004) "Teaching with variation: A Chinese way of promoting effective mathematics learning" from "How Chinese learn mathematics: Perspectives from insiders" (p. 309). **Intelligent practice** is a term used to describe practice exercises that integrate the development of fluency with the deepening of conceptual understanding. Attention is drawn to the mathematical structures and relationships to assist in the deepening of conceptual understanding, whilst at the same time developing fluency through practice.